This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

Figure 1

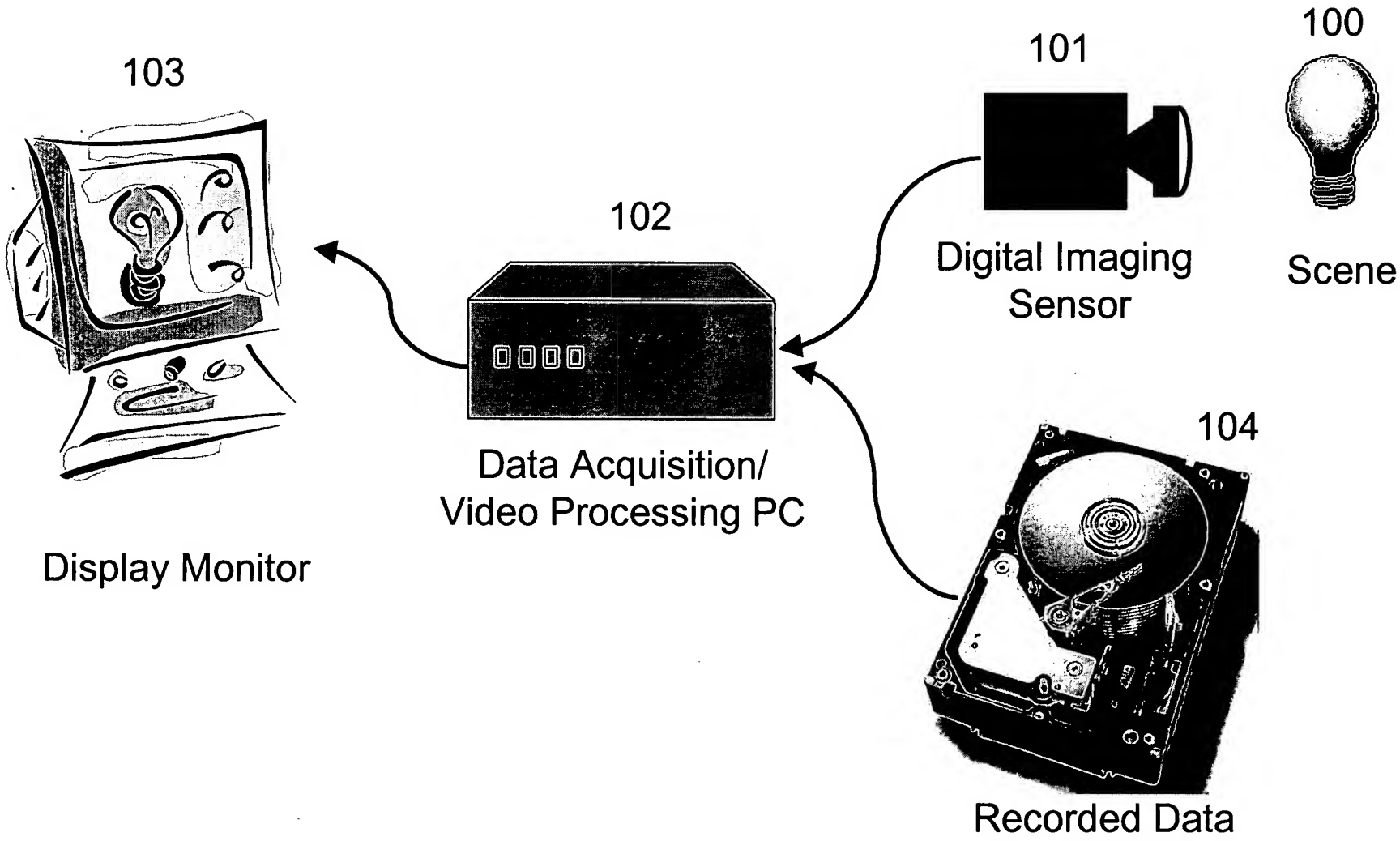

100
101
103
102
Digital Imaging Sensor
Scene
Data Acquisition/ Video Processing PC
104
Display Monitor
Recorded Data

Figure 2

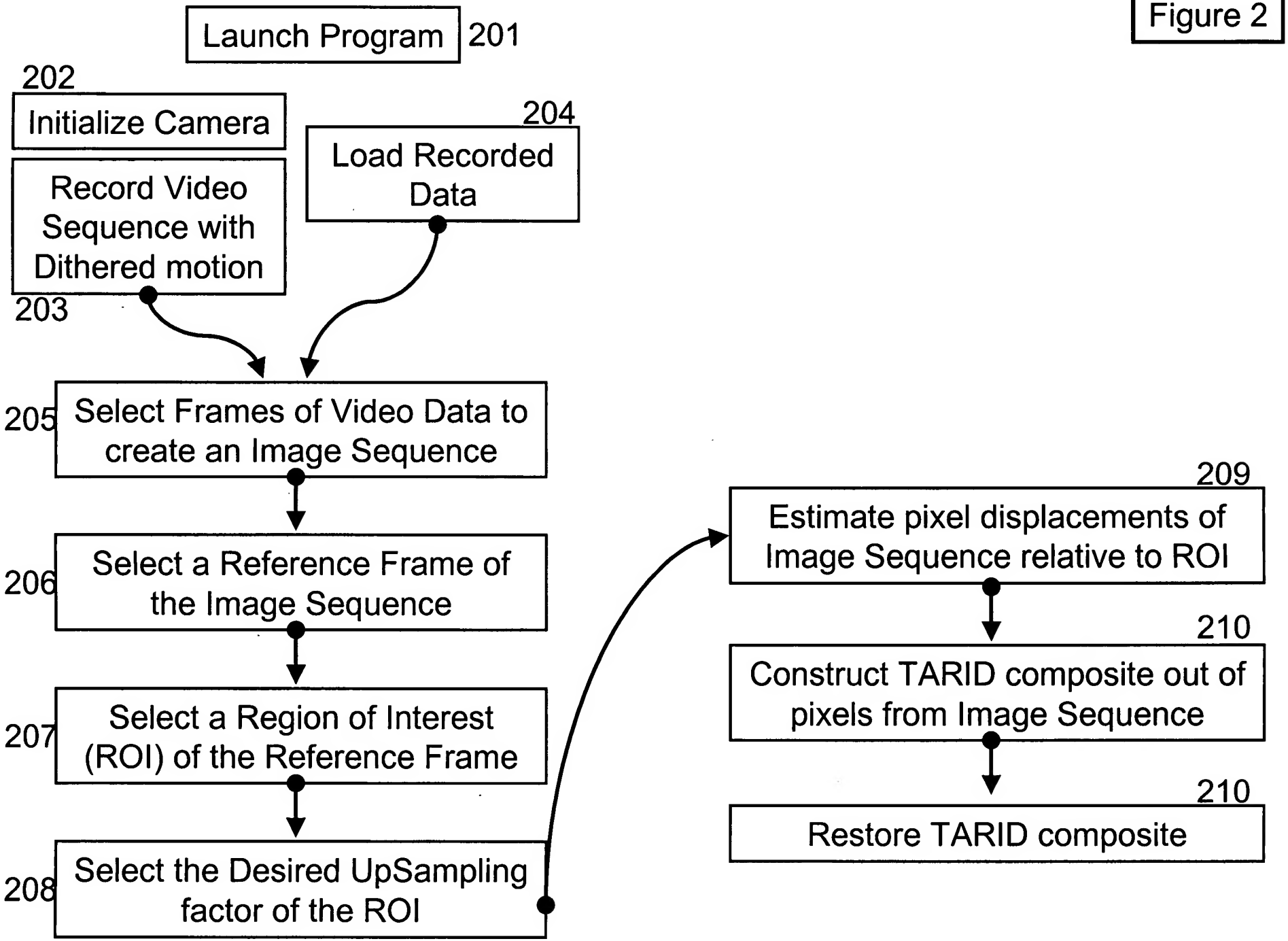

Launch Program
201
202
Initialize Camera
Record Video Sequence with Dithered motion
203
204
Load Recorded Data
205
Select Frames of Video Data to create an Image Sequence
206
Select a Reference Frame of the Image Sequence
207
Select a Region of Interest (ROI) of the Reference Frame
208
Select the Desired UpSampling factor of the ROI
209
Estimate pixel displacements of Image Sequence relative to ROI
210
Construct TARID composite out of pixels from Image Sequence
210
Restore TARID composite

Figure 3

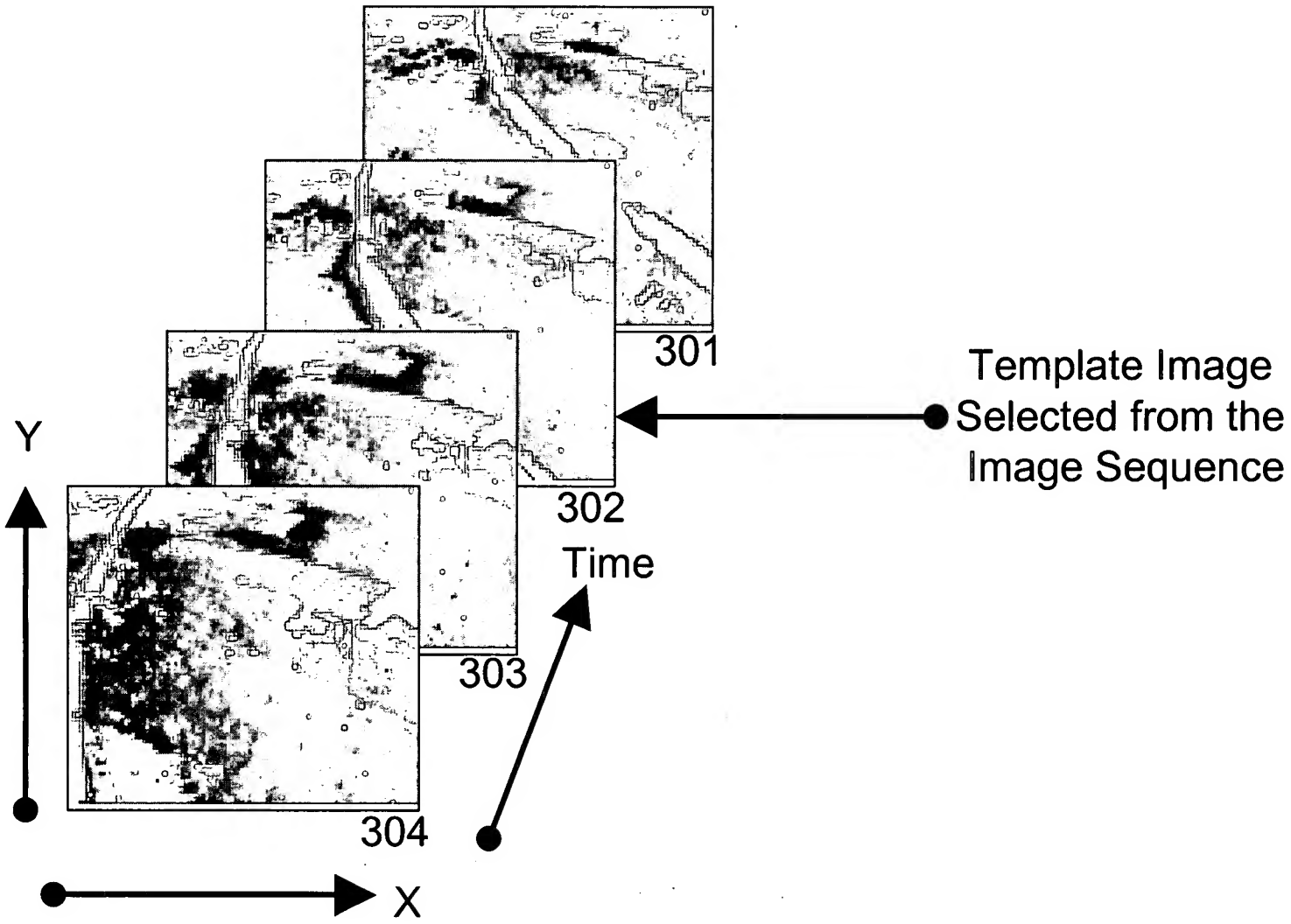

301
302
303
304
Template Image
Selected from the
Image Sequence
Time
Y
X

Figure 4

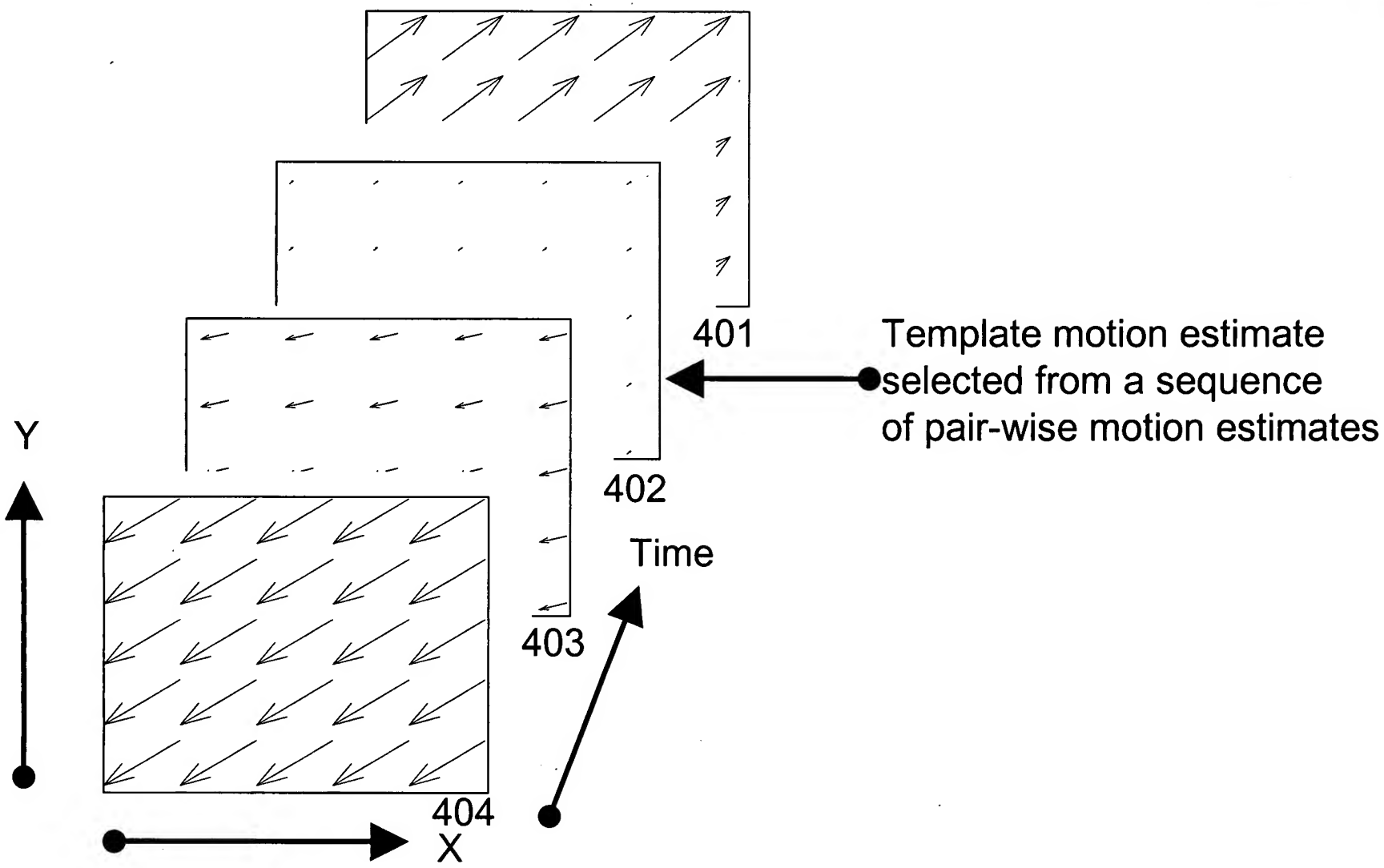
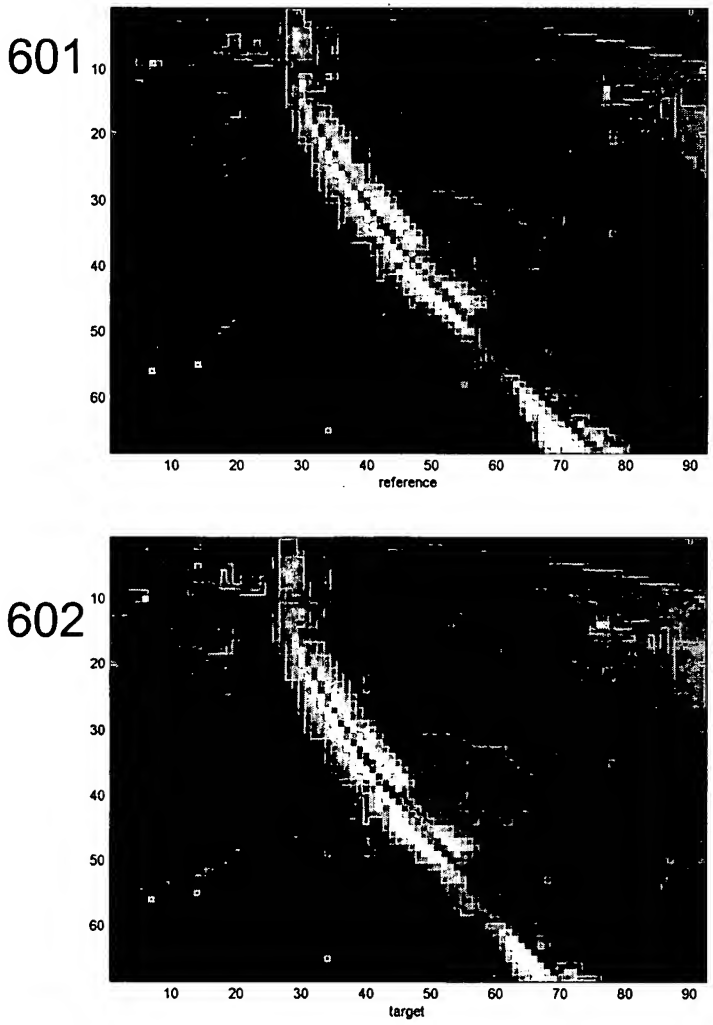

401
Template motion estimate
selected from a sequence
of pair-wise motion estimates
402
Y
Time
403
404
X

Figure 5

```
function [shift] = correlation2D(ref,tgt);
ref = double(ref);tgt = double(tgt);sze = size(ref);
corr2D = fftshift(ifft2(fft2(ref).*conj(fft2(tgt))));
[Y,I] = max(corr2D(:));
[yy,xx] = ind2sub(sze,I);
shift = [yy xx] - sze/2 - [1 1];
shift = -shift;
```

Figure 6


601
10
20
30
40
50
60
10 20 30 40 50 60 70 80 90
reference
602
10
20
30
40
50
60
10 20 30 40 50 60 70 80 90
target

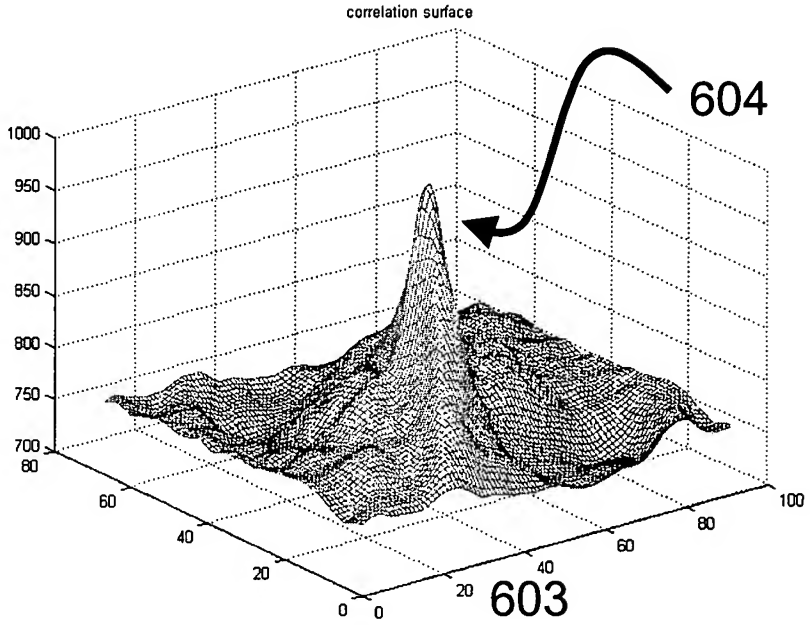

correlation surface
604
1000
950
900
850
800
750
700
80
60
40
20
0
0
20
40
60
80
100
603

Figure 7

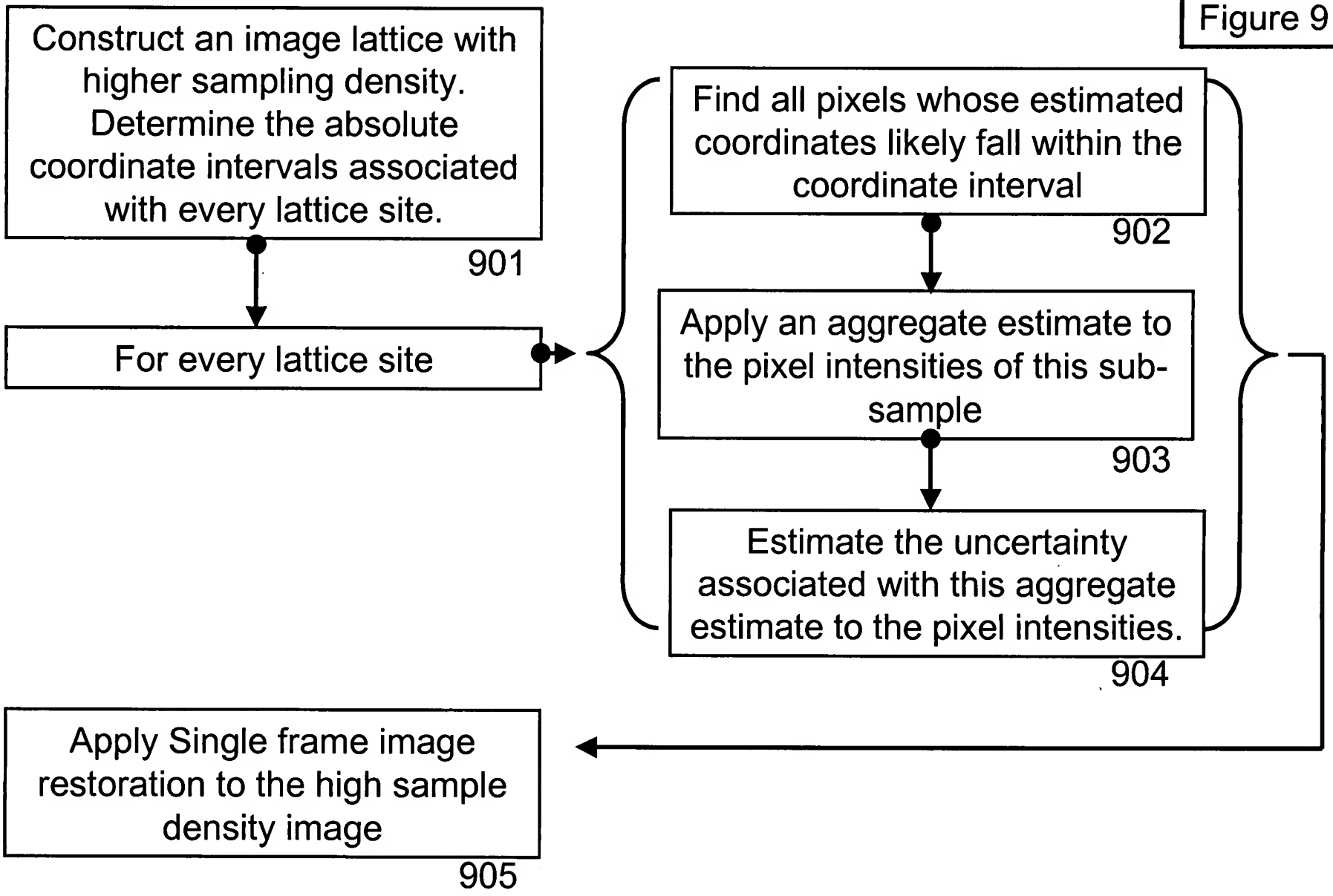
```
function [shift] = grad_est(ref,tgt);
ref = double(ref);
tgt = double(tgt);
S000 = (ref(1:end-1,1:end-1));
S100 = (ref(2:end-0,1:end-1));
S010 = (ref(1:end-1,2:end-0));
S110 = (ref(2:end-0,2:end-0));
S001 = (tgt(1:end-1,1:end-1));
S101 = (tgt(2:end-0,1:end-1));
S011 = (tgt(1:end-1,2:end-0));
S111 = (tgt(2:end-0,2:end-0));
%
dSdx1 = (S100-S000+S110-S010+S101-S001+S111-S011)/4;
dSdx2 = (S010-S000+S110-S100+S011-S001+S111-S101)/4;
dSdx3 = (S001-S000+S101-S100+S011-S010+S111-S110)/4;
%
aa = dSdx1.^2;
a = sum(aa(:));
bb = dSdx2.^2;
b = sum(bb(:));
ab = dSdx1.*dSdx2;
d = sum(ab(:));
A = [a d; d b];
%
ac = dSdx1.*dSdx3;
bc = dSdx2.*dSdx3;
B = -[sum(ac(:)) sum(bc(:))]';
%
shift = A \ B;
shift = shift';
```

Figure 8

801

(1,1)	(1,2)	(1,3)	…	(1,m)
(2,1)	(2,2)	(2,3)	…	(2,m)
(3,2)	(3,2)	(3,3)	…	(3,m)
…	…	…	…	…
(n,1)	(n,2)	(n,3)	…	(n,m)

Figure 9


Construct an image lattice with higher sampling density. Determine the absolute coordinate intervals associated with every lattice site.
901
For every lattice site
Find all pixels whose estimated coordinates likely fall within the coordinate interval
902
Apply an aggregate estimate to the pixel intensities of this sub-sample
903
Estimate the uncertainty associated with this aggregate estimate to the pixel intensities.
904
Apply Single frame image restoration to the high sample density image
905

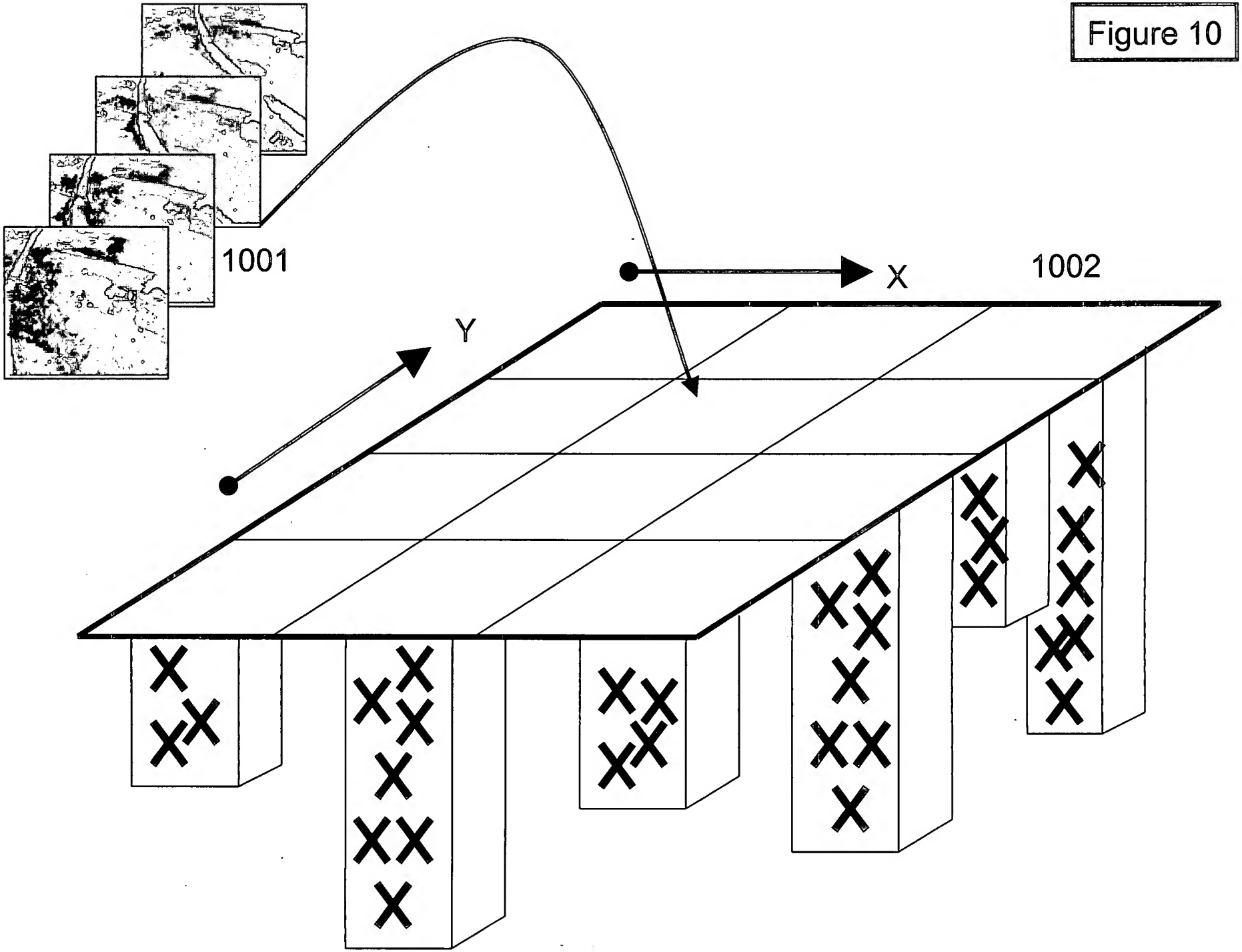



Figure 10